

Detailed Globes Enhance Education and Recreation

Originating Technology/NASA Contribution

Earth from space—swirling wisps of white against a backdrop of deep azure, punctuated with brown and green swatches of land, all etched on one orb surrounded by black space, floating, seemingly isolated, but teeming with humanity and other forms of life. It is an iconic image, first captured November 10, 1967, by the Applications Technology Satellite (ATS)-3, an unmanned craft conducting payload experiments and examining the space environment. Since then, astronauts and spacecraft have sent back hundreds of pictures of Earth, and each one has had the same breathtaking effect.

Seeing our home planet from space is one of those self-reflective experiences, like seeing yourself in a picture, or hearing your voice on tape. It tells you something about yourself from outside of yourself. It is an experience that changes your understanding of the world and your place in it.

This phenomenon is best illustrated by the words of space travelers who, upon reaching orbit, have gazed back at Earth and felt the profound impact of viewing the planet in its entirety.

Frank Borman, Apollo 8 commander, said, “The view of the Earth from the Moon fascinated me—a small disk, 240,000 miles away. . . . Raging nationalistic interests, famines, wars, pestilence don’t show from that distance.”

Another veteran of the Apollo 8 mission, William Anders, had this to say: “We came all this way to explore the Moon, and the most important thing is that we discovered the Earth.”

Neil Armstrong, the first person to step foot on the Moon, described the feeling of perspective he experienced when staring out at the Earth from the spacecraft window: “It suddenly struck me that that tiny pea, pretty and blue, was the Earth. I put up my thumb and shut one eye, and my thumb blotted out the planet Earth. I didn’t feel like a giant. I felt very, very small.”

Alan Shepard, commander of the Apollo 14 mission, the eighth manned mission to the Moon, said of the experience of seeing the home planet in its entirety, “If somebody had said before the flight, ‘Are you going to get carried away looking at the Earth from the Moon?’ I would have said, ‘No, no way.’ But yet when I first looked back at the Earth, standing on the Moon, I cried.”

Apollo 15 astronaut, James Irwin, said of the experience, “As we got further and further away, it [the Earth] diminished in size. Finally it shrank to the size of a marble, the most beautiful you can imagine. That

beautiful, warm, living object looked so fragile, so delicate, that if you touched it with a finger it would crumble and fall apart. Seeing this has to change a man.”

Astronaut Alfred Worden, another of the original Apollo crew, and pilot of the Apollo 15 mission, said of his experience, “Now I know why I’m here. Not for a closer look at the Moon, but to look back at our home, the Earth.”

Years later, space shuttle astronauts are still finding the view of Earth from space a humbling and profound experience. Don Lind, astronaut aboard the STS-51B mission



This 16-foot-diameter, pedestal-mounted, rotating globe was featured at the 2006 Wirefly X-Prize Cup in Las Cruces, New Mexico. This exposition of personal space flight is a “celebration of forward-looking technology, space exploration, and education,” attracting thousands of people every October.

said, “Think about the picture of the Earth coming up over the horizon of the Moon, which I call the picture of the century. Every crew that went to the Moon took that same picture. It is probably as moving as anything in reorienting people’s idea to the whole world concept.”

The experience was perhaps best illustrated, however, by Sultan bin Salman bin Abdulaziz Al Saud, a Saudi Arabian payload specialist aboard STS-51G, a space shuttle mission comprised of American, French, and Saudi astronauts, when he said, “The first day or so, we all pointed to our countries. The third or fourth day, we were pointing to our continents. By the fifth day, we were aware of only one Earth.”

Partnership

In 1985, inspired by the pictures he had seen of the Earth from space, Eric J. Morris founded a company devoted to designing and producing photorealistic replicas of our planet. The company, [Orbis World Globes](#), is located in Eastsound, Washington, and creates inflatable globes in many sizes that depict Earth as it is seen from space, complete with atmospheric cloud cover.

Utilizing available technology of the mid-1980s, the original EarthBall design was derived from an artist’s compilation of NASA photographs and National Oceanic and Atmospheric Administration (NOAA) weather satellite faxes. Over the following 2 decades, as 3-D imaging software, more powerful computers, and superwide inkjet printers became readily available, Orbis employed these evolving capabilities to develop larger and more accurate world globes. Applying proprietary cartographic software to transform flat-map imagery into multiple gores (2-D tapered sections) for creating spherical globes, Orbis now designs and produces the most visually authentic replicas of Earth ever created.

NASA took notice of Orbis globes and employed a 16-inch-diameter EarthBall for an educational film it made aboard the STS-45 shuttle mission. “The Atmosphere Below,” shot during the 9-day mission



This 6-foot-diameter rotating Orbis globe is installed in the Children’s Wing Atrium of Northland Church in Longwood, Florida.

aboard Atlantis in 1992, features astronauts using the EarthBall to explain how scientists use the unique vantage point of space to study the Earth’s atmosphere.

Orbis later collaborated with NASA to create two giant world globes for display at the 2002 Olympic Winter Games in Salt Lake City. Creating the two 16-foot-diameter Earth globes with NASA involved updating the lower-resolution imagery the company had been using with more detailed, recent satellite imagery. This imagery was taken by NASA’s Moderate Resolution Imaging Spectroradiometer satellite, combined with

observations of Antarctica made by NOAA’s Advanced Very High Resolution Radiometer sensor.

Though the cloud cover has been slightly reduced in order for most of the landforms to be visible, Orbis globes are otherwise meteorologically accurate. In the Northern Hemisphere, it is fall, and it is spring in the Southern Hemisphere.

The satellite image now printed on all Orbis globes displays 1-kilometer resolution, which means that each pixel in the digital image represents 1 square kilometer of the planet’s surface. It is 21,600 by 43,200 pixels in

size. According to Orbis, while specific portions of the Earth have been imaged with higher detail, as of 2002, the satellite image it uses was the most detailed composite image of the entire world in existence.

NASA's new Blue Marble: Next Generation satellite imagery now provides even higher 500-meter resolution, which Orbis is planning to utilize for giant (30-foot plus) diameter world globes.

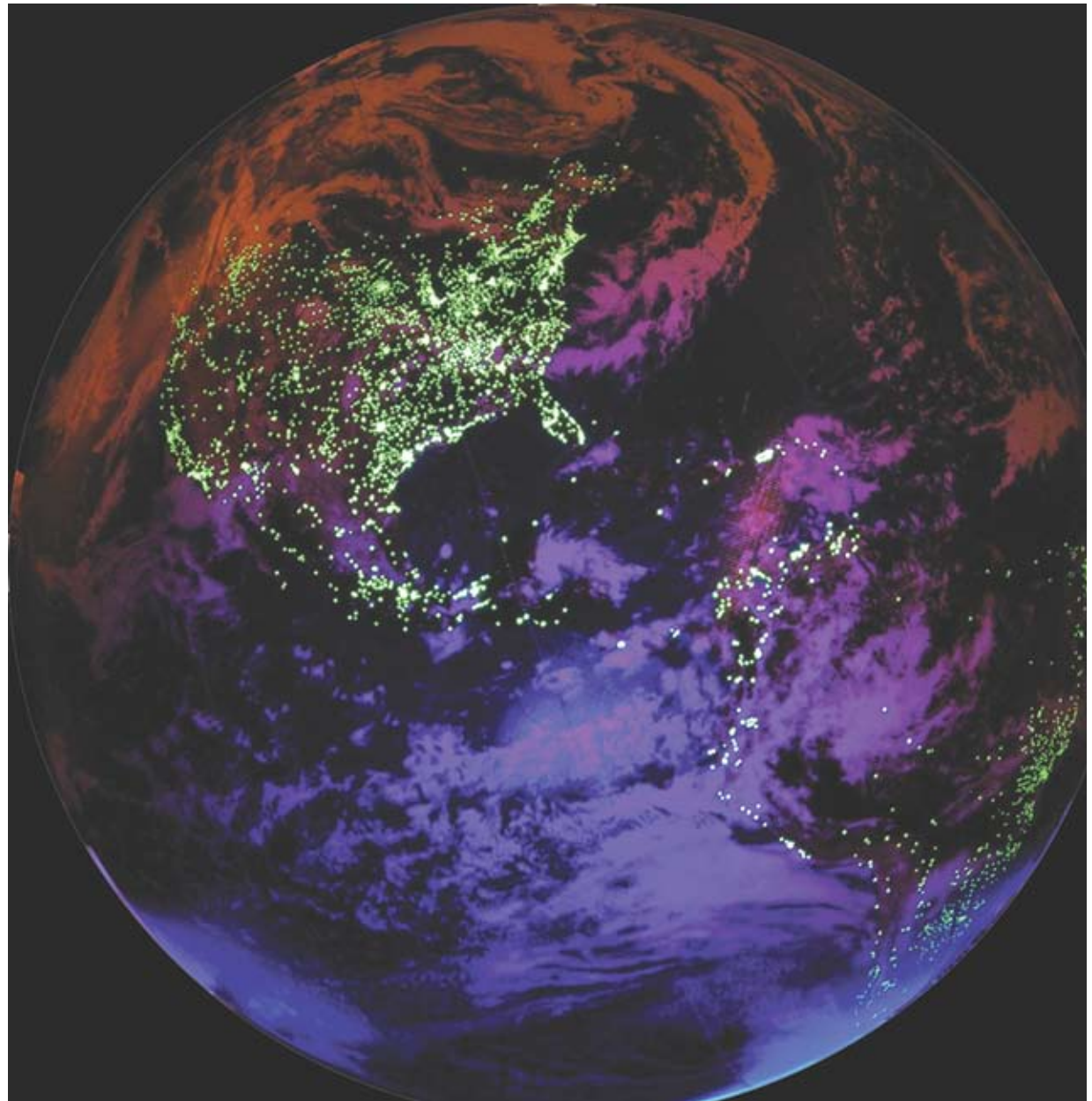
Orbis also developed the exclusive NightGlow Cities feature, enabling EarthBalls to display the world's cities as the globes revolve from daylight into night. Using light emissions data from U.S. Department of Defense satellites, city lights are identified with photoluminescent ink, fluorescing brightly under black ultraviolet light, adding a new dimension of authenticity to these world replicas.

Product Outcome

Orbis inflatable globes are available in sizes from 1 to 100 feet in diameter, with the most common being the standard 16-inch and 1-meter diameter EarthBalls. These smaller globes are ideal for educational purposes and have been used everywhere from preschools to universities. They come with a 20-page book of facts, games, and suggested activities, including a game of indoor classroom volleyball. They have been sold in thousands of gift shops, toy stores, museum shops, and specialty stores.

Over 100 Orbis world globes from 2 to 20 feet in diameter have been custom-built for a variety of display purposes. They have been used as temporary exhibits at numerous events, such as conferences, trade shows, festivals, concerts, and parades. For these types of purposes, the company maintains a fleet of rental globes ranging from 3 to 16 feet in diameter. Globes of various sizes have been exhibited at numerous events

This un-retouched photograph of a 4-foot-diameter Orbis globe features the world's cities fluorescing under black ultraviolet light. It was printed on special blackout digital fabric with the city lights added using ultraviolet-sensitive fluorescent paint.





Eric J. Morris, founder and chief cartographer of Orbis World Globes with a 4-foot-diameter cloud-free globe with the imprinted logo of the Instituto Nacional De Technica Aerospacial (National Institute of Aerospace Technology) in Spain.

worldwide. Last year, a 16-foot-diameter Orbis globe was exhibited at the United Nations' World Urban Forum, in Vancouver, Canada; the Space 2006 conference, in San Jose, California; and the X-Prize Cup Personal Spaceflight Exposition, in Las Cruces, New Mexico.

Giant Orbis globes have been put on permanent display at schools, churches, museums, libraries, and a variety of other locations. Orbis recently installed a 10-foot-diameter, internally illuminated, rotating globe in the education center at Washington's Fairchild Air Force Base; an 8-foot-diameter rotating world globe at the entrance to the new Evolving Planet exhibit in Chicago's Field Museum; and another 8-foot-diameter rotating world globe with NightGlow Cities in the new Ripley's Believe It or Not! museum in New York City's Times Square.

Orbis globes can be mounted on floor pedestals, suspended overhead, filled with helium and tethered



This 10-foot-diameter Orbis globe is being carried in a peace march in Seattle, Washington, in March 2005. Orbis globes have been a magnet for spectators and cameras in numerous parades, performances, and rallies around the world. (The gold building in the background is the Experience Music Project designed by renowned architect Frank Gehry.)

in the air, or even deployed as remote-controlled flying "EarthBlimps." Small electric motors enable the globes to slowly rotate on their axes, as does the real Earth. Internal illumination, custom graphics, and many other options are also available.

Twenty-two years ago, Eric J. Morris mused, "If only others could see Earth as the astronauts observe it,

perhaps they would be similarly inspired." Considering the success of Orbis World Globes, people of all ages are being inspired everyday to appreciate our wondrous planet, Earth. ❖